PR
5899
W54c

Wormald

Chemical jingles for bunglers

THE LIBRARY
OF
THE UNIVERSITY
OF CALIFORNIA
LOS ANGELES

(Arthur)

CHEMICAL JINGLES

FOR

BUNGLERS,

BY ONE OF THEM.

"These few precepts in thy memory
Look thou character."

Cambridge:
H. W. Wallis, 24, Sidney Street.
1894.

—

ONE SHILLING.

Digitized by the Internet Archive
in 2008 with funding from
Microsoft Corporation

http://www.archive.org/details/chemicaljinglesf00worm

PR
5899
W54c

PREFACE.

With Fenton's analytical tables before him the chemical novice works through the numbered bottles in the laboratory smoothly enough; but if he shut the book up or leave it behind him the case is altered. Scientists will laugh at the following doggrel: it is enough for the compiler that the great Göthe did not despise similar reminders. He gives us a specimen:

"Ober-Yssel; viel Morast
Macht das gute Land verhasst."

It is not less philosophical to teach Chemical Manipulation by rhyme, than to teach the genders of Latin nouns by the same method.

918441

DRY TESTS.

I. On the charcoal if you blow,
Several solids you may know:
Hydrarge and *Am*[1] volatilise
And *As*[2], like garlic, wets your eyes:
Or you may get a whitish crust;
'Tis *Am* or *An*[3] or *As*[3] combust:
When heated yellow, white when cold,
Assures us that we *Zinc* behold:
But if the yellow cold we see,
The salt will *Lead* or *Bismuth* be;
A brown is *Cadmium*: white or black,
We test again on different tack.
If the substance deflagrate,
Of *N* or *Chlor*, it is the *-ate*.[4]

II. The **white** with Nitrate of Cobalt
Turns blue for *Aluminium* salt;
A *phosphate* too may blue be seen,
But if the substance turn to green
'Tis further evidence of *Zinc*:
Magnesium gives a pallid pink.

III. A residue of **black** will need
Retesting by the borax bead;
While *Chrom* is green, and *Co* is blue,
Green hot, blue cold is sign of *Cu*;
But in reducing flame 'tis said
That Copper turns from blue to red,
The change is helped by adding tin.
A violet bead from *Man* you win;
But if the violet verge on brown,
You write the metal *Nickel* down:
Iron will give a rusty buff,
Or bottle green reduced enough.

IV. But if a metal granulate
On Carbon, add Na-carbonate,

1 i.e. Salts of Mercury and Ammonium.
2 An arsenic compound.
3 Ammonium, Antimony or Arsenic salt.
4 i.e. a Nitrate or Chlorate.

And heat it in reducing flame;
A red mass you may *Copper* name;
Beads malleable are *Lead* or *Tin*,
Or *Silver*, if no crust come in:
A *Bismuth* bead will flatten little,
And *Antimony's* bead is brittle.

V. Take some stuff on platinum wire,
Moistened first with Hydrochlor;
Note the colour of the fire,
Recollecting ViBGYOR.[1]
Violet is *Potassium* seen,
Blue are *Arsenic* and his fellow,[2]
Bar. and *Bor.* and *Cu* are green,
Sodium is yellow:
Orange *Calcium* puts on,
Crimson red betokens *Stron.*

VI. Volatilisers you may thrust
In dry bulb with some charcoal dust
And Sodium Carbonate, when *As*
Will throw a mirror on the glass:
Metallic *Mercury* sublimates;
Its smell an *Am-* salt indicates.

ANALYSIS OF METALS.

Group I.

If with Hydrochlor we souse
Silver, Lead, or Mercurous
White precipitates we make:
With Ammonia we shake;
Silver clears, but *Lead* is stable,
Mercury turns as black as sable.

[1] ViBGYOR, the initials of the colours of the prism, Violet, Indigo, Blue, Green, Yellow, Orange, Red. But here Indigo is omitted and the first two letters VI may be taken to represent Violet.

[2] *Arsenic* means etymologically the *male* metal; its "fellow" is *Antimony*, called by Dioscorides gynæceum, the female metal, (II Kings ix. 30; Jer. iv. 30; Ezek. xxiii. 40). The two metals are distinguished by Marsh's test.

GROUP II.

Eight metals of the second group
To Sulphuretted H must stoop.

(*a*) Arsenic, Antimony, Tin,
Dissolve Ammonium-Sulphide in;
Arsenic too in Carbonate,
The others leave precipitate:
Dissolve it up in Hydrochlor,
And this on Zinc and Platinum pour;
If you see a stain of black,
Antimony you may back.
Corrosive sub. reduces well
In *Stannous* salts to Calomel.

(*b*) L M B C C[1] deride
The charms of NH_4 sulphide:
Nitric solves them, (save *mercuric*),
Lead is brought down by sulphuric:
Ammonia *Bismuth* will subdue,
And *Copper* turn to liquid blue;
Yellow is only *Cadmium's* hue.

GROUP III.

Add a few drops of Nitric and boil,
Else Iron may play us a trick;
For Ferrous our efforts will foil,
Until oxidised to Ferric.

To exclude salts of Man. and of Mag.,
We next have to add Salmiac;[2]
Then Ammonia gives us a slag[3]
Of the metals beginning with FAC.[4]

Without care we may here be at sea,
Phosphates milky as if from the dairy
With Molybdate and HNO_3
Will give us the colour canary.

1 Lead. Mercuric, Bismuth, Copper, Cadmium.
2 The German name for NH_4Cl.
3 i.e. Precipitate, not an exact use of the term.
4 Ferrum, Aluminium, Chromium.

Solve the slag in salt-acid[1] anew;
A dash of Ferrocyanide
Will give us the colour of blue,
If *Iron* be what we have tried.

A solution which does not remain
Under caustic,[2] yet clears with excess,
And by salmiac's sullied again,
Aluminium ought to express.

Now *Chrome* is the last of these metals,
Which again is brought down by Ammonia,
Of purple-white hue when it settles:
The whole of Group III I have shewn ye.

GROUP IV.

Fourth group of metals we decide
By Ammonium Sulphide:
If precipitate it blacks,
Make a bead with some borax;
Cobalt gives a lustrous blue,
Nickel shews a dirtier hue.
Lighter sediments than these
Are given by Zinc and Manganese:
Boil them up in Hydrochlor,
Caustic gives us dregs once more:
If these are solvent in excess,
Pass a dose of H_2S;
If white again begin to sink,
We may say the metal's *Zinc*:
But if the caustic sediment
Seem to be more permanent,
Shake it till it turns to brown;
Thus is *Manganese* made known.

GROUP V.

With Am-carbonate derive
Precipitates from Cluster Five:
Hydrochlor will clear the scum,
But must be a minimum.

1 Hydrochloric acid, because derived from Na Cl (*Germ.* Salzsäure).
2 KOH or Na OH.

To a portion add some gypsum,[1]
Quick or slow it may precip. some :
Barium comes at once to view,
Slow and warmed comes *Strontium* too :
Oxalic and Ammonia joined
In other portion *Calcium* find.

GROUP VI.

If by this time you're not prostrate,
Seek *Magnesium* with Phosphate.

GROUP VII.

Boil the stuff with caustic soda
Am will give Ammonia's odour ;
Flame of violet shews you *K*,
Yellow flame intense is *Na*.

EXAMINATION FOR ACID RADICLES.

The solid substance should be mated
With Sulphuric concentrated :
If Carbonic effervesce[2]
'Twill give limewater milkiness ;
But if it burn *as well*,[3] you state
Oxalate, not *Carbonate*.
Other gases you excite
From the *Sulphs*, both *-ide* and *-ite ;*
Both are smelly ; both are seen
Reducing Bichromate to green ;
While Sulphide only will attack,
Lead acetate and turn it black.
Better try these salts once more
(Save Oxalate) with Hydrochlor.

Chloride, Bromide, Iodide,
Clouds and vapours will decide.
If a white cloud passes o'er,
We may further try for *Chlor*.

1 Calcium Sulphate.
2 i.e. if a Carbonate be present.
3 i.e. if CO is given off, as well as CO_2.

With *liquid*[1] stuff again begin
And pass some Silver Nitrate in ;
From *Chloride*, Silver Chloride settles
(See action in First Group of Metals) :
In Ammonia this is *sol*,
But in Nitric not at all.

Iodide gives a violet vapour,
Turning *blue* a starch paste paper ;
Chlorine-water liberates I,
Shake it up with Carbon-Di.,
Bringing out a *purple* dye.

For "blue" and "purple," *brown* and *buff*,
Brom- (not Iod)- *ide's* the stuff.

Light yellow clouds you hardly see
Denote a *salt of* NO_3.[2]
But if yellow means a *chlorate*,
It may explode, and you deplore it.
For *Tartrates* blackening is the clue,
Evolving CO one and two.[3]

If Sulphuric gives no effervescence,
The *Sulphates* with Chloride of Barium
Will give us a milky excrescence :
Hydrochloric and Nitric won't vary 'm.

To a *Nitrate* solution we bring
Ferrous sulphate, and then a few drops
Of Sulphuric will form a brown ring,
Where one liquid the other o'ertops.

For *Phosphates* and *Arsenates* dip
In Molybdate as mentioned in III ;[4]
Silver nitrate too gives a precip. ;
P's yellow, A's ruddy will be.

Strong Sulphuric and "just a wee drap"
Of Spirits an *Acetate* grapples ;
For heat them together we tap
Ethyl acetate smelling of apples.

[1] If we have to deal with an insoluble chloride (e.g. calomel, Hg Cl.) add first KOH (or NaOH), forming KCl (or NaCl) : then excess of HNO_3 to get rid of any KOH (or NaOH) remaining over, and then $AgNO_3$. Thus we avoid getting a brown precipitate of AgOH.

[2] i.e. a Nitrate ; see below, 181.

[3] Compare Oxalate, 144.

[4] Line 90.

TO TEST AN ALLOY.

Alloy you evaporate placed in a bowl
Of liquid half nitric, and water the rest:
Then fill with acidified water the whole,[1]
Boil and filter: the filtrate as usual test.

The precipitate, thoroughly washed, can contain
Only compounds of *Ant.*, *Stannic Tin*, or of *Bi*;
But the last doesn't matter; you'll meet it again
In the filtrate: so only for others you try.

Digest with Am-Sulphide, and filter the mass;
Some yellowish dregs with salt-acid you grip:
Then Zinc will make stannic to stannous salt pass,
When hot and strong salt-acid solves the precip.

Then proceed as in Group II. A white precipitate at the end is only Sulphur.

REDUCERS AND OXIDISERS.

A general form you won't deny,
For salts will be $M_x R_y$:
If reduction you perplex
Reduce the ratio y to x;
A reducing agent thus
Converts an *-ic* salt, into *-ous*.
To diminish x to y, sir,
You must use an oxidiser;
This from *-ous* an -ic supplies ye.

REDUCERS.

H itself, and Hydracids of S and of I,
Stannous Chloride and Sulphur-O_2
Will *reduce* ferric salts, as you may descry
By Ferricyanide turning blue.

For Ferr*ic* denies to Ferri-cyanide,
What both of them grant to Ferro;[2]
But Ferr*ic*, when KCNS is applied,
Gives a red which no Ferrous can shew.

[1] That is to say, when the evaporation has been carried out nearly to dryness, you add a drop or two of Nitric acid again and fill up with water.

[2] Namely, the blue coloration. Compare line 95.

Bichromate of Potash, when treated with H,
Will reduce to a basylous green ;
H_2S, SO_2 the same colour will fetch,
As for Sulph-ides and -ites has been seen.[1]

SO_2 will an arsen-*ate* turn to an *-ite* ;
Sulphuric diluted and Ki [2]
Will form Hydriodic, which Ferr*ic* will bite
Giving *-ous*, Hydrochlor and free I.

Stannous chloride one atom of Chlorine subtracts,
From Cor. Sub., then the other as well ;[3]
As reducer on Cuprie solutions it acts,
Made from Sulphate and Hydro-Cl.

OXIDISERS.

Two K salts,—Bichrom. and Perman.—
Chlor-water, and HNO_3
Are good oxidisers, which can
From Dyad to Triad raise *Fe.*[4]

Hypochlorites of Na and of Lime,
With soda and manganous salt
Will give the peroxide : sublime,
One-third of the O will not halt.

PREPARATION OF CHLORIDES.

(*a*) *From Chlorine.*

If metals directly with Chlorine unite
To form chlorides, they're spelt with an "**i**;"
Zinc and trivalent Iron the gas will ignite,
K and Na, As. An. Tin, Cuivre and Blei.[5]

Chromic oxide and charcoal dust thoroughly mix,
Stream of Chlor gives on heating Cro_2 Cl_6,
And chromic gives divalent chromous chloride,
If a dry stream of Hydrogen you can provide.

(*b*) *From Hydrochloric Acid.*

Salt-acid many chlorides settles
From Oxides, Hydrates, Salts and Metals ;

1 Line 118.
2 KI, a monosyllable.
3 This is called the *Maggie* Test, since we get first a *white* precipitate of Calomel, and then a *black* precipitate of Mercury.
4 Line 82.
5 We use French *Cuivre*, Copper, and German *Blei*, Lead, to preserve the "i" spelling.

From Ferrous Iron and Zinc again,
As seen in making Hydrogen ;[1]
From Aqua Regia Cl_2
Combines with Mercury and Cu.

The cup*ric* oxide, both of Fe,
Manganic (giving Chlor as well)
The caustic hydrates, NH_3
And Group I salts join H Cl.[2]

(*c*) *From other Chlorides.*

Metallic mercury we win,
If either chloride act on tin ;
Stannous or -ic chloride comes in.
Stannous chlor. *reduces* too[3]
Chlorides of *Mercury* and *Cu ;*
That is, both Merc and Cupric Chlor
Oxidise Stan-chlor two to four.

Corrosive sub. and mer. combined,
Sublimed or rubbed will calomel find :
So Cu and Cupric chlor espouse,—
Excluding air,—and form cuprous.

A chloride of the alkalis,
To any first group salt applies.
From either mercury sulphate
With common salt, a sublimate
Of chloride mercur*ous* or *-ic*,
On upper part of tube will stick.

PREPARATION OF NITRATES.

(*a*) *From Nitric acid and a metal.*

Nitric acid forms nitrates,
H it never liberates ;
For H the Nitric reattacks,
Sticking to its Os like wax.
Clouds you may or may not see
Any nitroxide may be.
Zinc gives nitrous, N_2O
Copper -tric (by Cs you know).
Silver gives brown N_2O_3
Ammonium-nitrate comes with Fe.

1 Line 306. 2 Line 57. 3 Line 230.

(*b*) *From Oxides.*

From Lead and Copper and Alum [1]
The nitrate will from oxide come.

(*c*) *From Salts.*

For alkalines, Man. Mag and Lead,
You use the carbonate instead.

USEFUL CHAIN of double decompositions forming chlorides and nitrates: the ingredients on the left-hand side of the equations only are mentioned.

Hydrochlor and calcic car.
Calcic chlor and sulph. of bar.
Baric chlor, Na NO_3
Baric Nit. and Sulph. of Fe.

PREPARATION OF SULPHATES.

Sulphuric acid acts on blocks
Of Zinc or Iron or Cupric Ox,
And gives the vitriols, white, green, blue,[2]
The vowels alike will give the cue.
From sulphates no precips arrive
Except for *lead* and Cluster Five.
The monads KAN [3] and triads FAC [4]
Form double sulphates: halve and tack
Twelve aqs. on: alums' formulae,
As K Al $(SO_4)_2$,[5] 12 aquae.

PREPARATION OF GASES, &c.

Hydrogen.

From hydrochlor or vit.[6] dilute
On iron or zinc a gas will shoot;
'Tis H: so K or Fe will fetch
From steam the O, and leave the H.

1 i.e. Aluminium.
2 White vitriol is zinc sulphate, green vitriol is ferrous sulphate blue vitriol is cupric sulphate.
3 KAN, Kalium (Potassium), Ammonium, Natrium (Sodium).
4 FAC. Ferrum, Aluminium, Chromium.
5 Pronounce Kal so four two.
6 Vit. for Oil of Vitriol, i.e., Sulphuric Acid.

Oxygen.

From K-chlorate we get chloride
(First perchlorate) and O beside:
From Manganese peroxide's glow
Or mixed with vit.[1] get *eau* and O.

Nitrogen.

From air, by burning P and Cu,
Take O, and N's the residue;
Ammon and Chlor make Salmiac
With 8 and 3 two N's will lack;
Or heat ammonium nitrite.
N nothing burns save B and Tit.

Chlorine.

Salt and Vit.[1] give Hydrochlor,
And this or they with Man. perox.
Extract the elemental Chlor
So powerful in bleaching frocks.

Hydrogen peroxide.

Perox. of *Bar* instead of *Man*
Is changed upon a different plan:
It yields the stuff whose symbols show.
The same as water plus an O.

Nitrous Oxide. (Laughing Gas) N_2O.

Am-nitrate gives us laughing gas
From Nitric poured on Zinc 'twill pass:
It does not form red fumes with NO,
Nor pyrogallic brown like O.

Nitric Oxide (NO).

From Vit., Saltpetre, Vitriol green
Two sulphates and NO are seen;
Copper and Nitric give the same.
It browns green vit., and douses flame.

Nitrous Anhydride (N_2O_3).

Nitric on As or Ag or Starch
Will make Nitrous anhydride march.

1 Vit. for Oil of Vitriol, i.e., Sulphuric Acid.

Nitric Peroxide (NO_2 or N_2O_4).

Lead Nitrate gives us NO_2,
Or Nitric poured on tin will do

Nitric Anhydride (N_2O_5).

P_2O_5 in Nitric, when
The letter P is changed to N.
O'er silver nitrate pass dry Clo
Anhydride forms as well as O.

Ammonia (NH_3).

Ammonia's made from Ammon. sal
With hydrates K or Na or Cal.

Carbonic gas (CO_2).

Hydrochloric poured on chalk,
Will make Carbonic Acid walk.

Carbon Monoxide (CO).

Oxalic acid dehydrated
By Sulphuric concentrated
Gives CO_1 and CO_2;
If the mixture passes through
Caustic soda, *one* is left
Of companion gas bereft.

A FEW ORGANIC SUBSTANCES.

The numbers (in brackets) in this section refer to the *pages* of "Remsen's Organic Chemistry."

Methane (23).

Two disgusting smells [1] are proper
To give Methane over Copper.
K-caustic, and K-acetate,
Give Methane and K-carbonate.

Ethane (34, 35, 24).

From wood we get meth-hydrate, *al.*[2]
Hydracid changes this to *hal.*[3]
Anhydrous Na takes up again
The Halogen and leaves *Ethane.*

[1] H_2S and CS_2. [2] Al = alcohol, Hal = haloid.

ALCOHOL (38).

But Ethyl-Alc. from sugar fix
Whose formula is six foot six ; [1]
The ferment gives carbonic off :
(So wine fermenting makes you cough).

Or if to any Paraffin,
We add Chlor-, Brom-, or Iod-ine
A halide comes, which boiled with K
Gives alcohol another way.

ORGANIC ACIDS (47).

Bichromate and weak vitriol [2]
Knock H_2 out of alcohol ; 370
And then go on to add an O,
Whence acids of each series flow.

ETHER (43). ETHYLENE (212).

If vitriol's[2] strength and temp. you tether,
With alcohol 'twill give you *Ether ;*
But if the vit. is hot and strong
The al. brings *Ethylene* along :
To burn a cubic foot of such
In air, takes fifteen times as much ;
Its chloride is the liquid Dutch.
If the combustion's incomplete, 380
From Ethylene we get *Acet.* (222)
If *cuprous ox.* in *am.* you dip,
Acetylene gives red precip. (224)

CHLOROFORM (53, 54).

From ethyl alcohol and Chlor.
First aldehyde, and then with more
Chloral,[3] from which with *Pot* we hook
Chloroform and *Henry Cook*.[4]

IODOFORM (28).

From alc., I, sodium carbonate
Result Iodoform we state.

[1] $C_6H_{12}O_6$: halve and subtract CO_2 ; we get ethyl alcohol's formula.
[2] Vitriol = Sulphuric Acid.
[3] Chloral's syllables suggest *Chlor*ine and *Al*cohol.
[4] H.COOK = Potassium Formate.

ETHYLAMINE (29, 94). $NH_2(C_2H_5)$.

Red phosphorus and alc. and I
Give monoyod,[1] and then we shy
Ammonia, then caustic in,
And so we get *Ethylamine*.

GLYCERINE (147, 148). $(C_3H_5(OH)_3)$.

Trihydrate propyl alcohol
Is glycerine, which we may pull
With caustic out of mutton-fat,
Which is but glyceryl stearate;
Leaving Na-stearate,—soap, the hard;
Or K, the soft; or Cal., the curd.

ACIDS.

From sugar Nitric Ac. unlocks
The COOH-COOH which we call the Ox[2] (143),
And treating this with *glycerine*
The ant and nettle acid's[3] seen (55).
Ac-ac[4] from alc. and platinum black;
Hydroxy-pro. is named from *lac*[5] (160)
You can make it, if you please,
From sugar, tart, and putrid cheese (161).

BENZENE (230, 231). (C_6H_6).

Light and heavy oils of tar
Give the Ben-tribe of Hydrocar.
Caustic soda solves phenol,
Bases yield to vitriol;
By fractional distilment you
Get *Benzene* from the residue.

For every H of six in Ben
We substitute a halogen, (253)
But *add* a Hal. to every H
'Twill decompose to three of each. (254)

PHENOL (269) (C_6H_5OH).

The phenol which in tar is blended
An alkali will hold suspended;

1 Monoyod = Ethyl iodide, C_2H_5I. 2 Oxalic acid.
3 Formic acid, HCOOH. 4 Acetic acid, CH_3 COOH.
5 Lactic acid (C_2H_4.OH.COOH).

We then precipitate once more
From heavy oil with Hydrochlor.

Aniline (258, 260). (C_6H_5 NH_2).

Nitric to Ben Nitro prefixes,
Hence Aniline when with H it mixes.

Benzoic Acid (283). (C_6H_5 COOH).

Benzoic's phenyl *plus* a COOH:
Unite benzene and CO_2.

Salicylic Acid (298). (C_6H_4 OH. COOH).

For H we put a hydroxyl
The acid now is salicyl:
Its Na-salt from Na- phenolate
By CO_2 we separate. 430

Urea (200) CO $(NH_2)_2$.

Urea and ammon- cyanate
Are isomers; associate
Ammonia and gas phosgene
Urea and Hydrochlor are seen.
Dissolved in sodium hyp-chlorite.
C,N, salt, water come to light.

F. W. Talbot, Printer, 19, Sussex Street, Cambridge.

UNIVERSITY OF CALIFORNIA LIBRARY
Los Angeles
This book is DUE on the last date stamped below.

DISCHARGE-URL
OCT 25 1966
OCT 12 1981

Form L9-17m-8,'55(B3339s4)444

THE LIBRARY
UNIVERSITY OF CALIFORNIA
LOS ANGELES

Gaylord
PAMPHLET BINDER
Syracuse, N. Y.
Stockton, Calif.

UC SOUTHERN REGIONAL LIBRARY FACILITY
AA 000 373 791 3